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Scottish Survey of Literacy and Numeracy 2013 (Numeracy)

30th April 2014

We would like to thank the 10,500 pupils and their teachers in the 2,200 schools who took part in SSLN 2013.

The Scottish Survey of Literacy and Numeracy (SSLN) is a sample survey which monitors national performance in literacy and numeracy in alternate years. The survey assesses pupils at Primary 4 (P4, age 8-9), Primary 7 (P7, age 11-12), and Secondary 2 (S2, age 13-14).

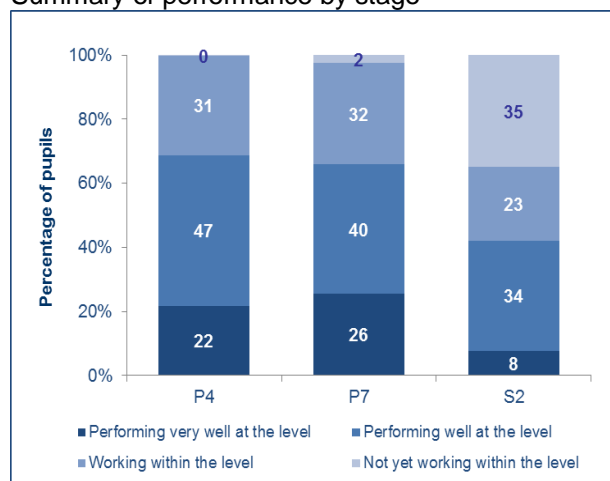
Full results are available from www.scotland.gov.uk/sslcn

Numeracy attainment in 2013

In 2013, about 69 per cent of P4 pupils and 66 per cent of P7 pupils were working well or very well in numeracy at the relevant Curriculum level¹ for their stage. This figure was lower for S2 pupils, with about 42 per cent of pupils working well or very well at Third Level.

The percentage of pupils not yet working within the level was less than one per cent of P4 pupils, about two per cent of P7 pupils and 35 per cent of S2 pupils.

Summary of performance by stage



¹ For definitions of the Curriculum levels, please see the [Education Scotland website](http://www.education.scot.nhs.uk).

At P7, boys were found to have performed better than girls, but there were no statistically significant differences at the P4 and S2 stages.

Pupils living in areas of least deprivation were more likely to be performing well or very well than pupils living in areas of most deprivation, across all stages. The disparity was largest at S2, where the proportion of pupils performing well or very well from the least deprived areas was 28 percentage points higher than pupils from the most deprived areas.

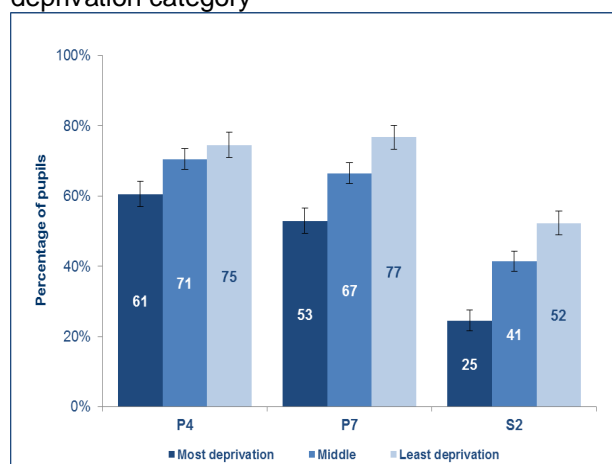
Numeracy attainment: comparisons between 2011 and 2013

At both P4 and P7, there were statistically significantly lower levels of attainment in 2013 compared to 2011. At P4, 69 per cent of pupils performed well or very well in 2013, compared to 76 per cent in 2011. Similarly, at P7, 66 per cent of pupils performed well or very well in 2013 compared to 72 per cent in 2011. The difference in S2 performance between 2011 and 2013 was negligible.

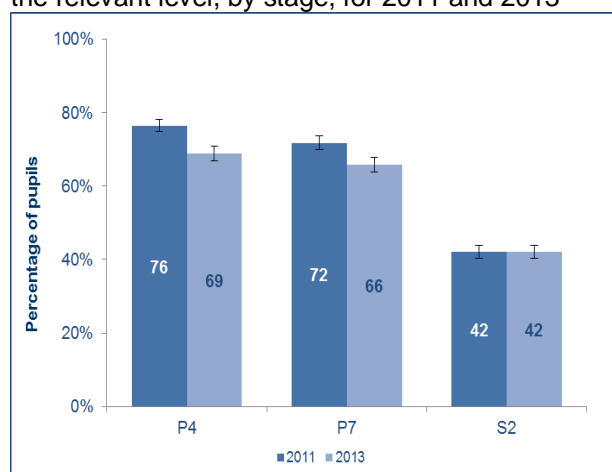
Pupil and teacher experiences and attitudes

Enjoyment of learning was high throughout the survey stages with over 85 per cent of pupils agreeing with the statement 'I enjoy learning'. The percentage of pupils was highest in P4 and decreased as stage increased. Pupils were also asked about their enjoyment of working with numbers and the responses to this showed a similar trend to learning in general.

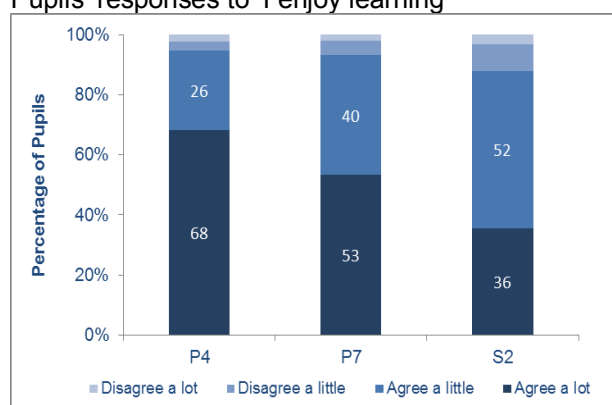
Percentage of pupils performing well or very well by deprivation category



Percentage of pupils performing well or very well at the relevant level, by stage, for 2011 and 2013



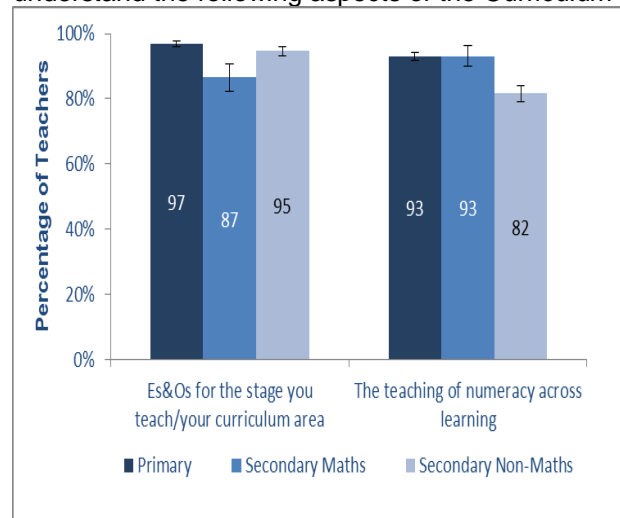
Pupils' responses to 'I enjoy learning'



Over 90 per cent of primary school teachers and over 80 per cent of secondary teachers reported they were very confident or fairly confident that they understood the Experiences and Outcomes for their curriculum area and the teaching of numeracy across learning.

Statistically significantly higher levels of secondary maths and non-maths teachers reported confidence in their understanding of the majority of CfE features (e.g. the concepts of breadth, challenge and application) in 2013 compared to 2011.

Percentage of teachers confident that they understand the following aspects of the Curriculum



Contents

	Page
Chapter 1: Introduction	5
1.1 What is the SSLN?	5
1.2 Survey components	6
1.3 Reporting SSLN results	7
Chapter 2: Assessment of numeracy	8
2.1 Overall distribution	9
2.2 Attainment by gender	11
2.3 Attainment by deprivation	12
2.4 Attainment by numeracy organiser and type of task	13
2.5 Mental maths	14
Chapter 3: Numeracy attainment over time	15
3.1 Methodology	15
3.2 Overall distribution	16
3.3 Attainment by gender	17
3.4 Attainment by deprivation	18
3.5 Attainment by numeracy organiser	19
Chapter 4: Pupil questionnaire	20
4.1 Activities in school	20
4.2 Attitudes to learning and numeracy	21
4.3 Activities outwith school	23
4.4 Links between attitudes and attainment	24
Chapter 5: Teacher Questionnaire	25
5.1 Classroom activities and resources	25
5.2 Teaching numeracy across the Curriculum	26
5.3 Aspects of Curriculum for Excellence	28
5.4 Professional Development	29
Chapter 6: Background notes	30

Chapter 1: Introduction

1.1 What is the SSLN?

The Scottish Survey of Literacy and Numeracy (SSLN) is an annual sample survey which monitors national performance of school children at P4, P7 and S2 in literacy and numeracy in alternate years. It also provides information which informs improvements in learning, teaching and assessment at classroom level through the development of Professional Learning Resources (PLRs) by Education Scotland. All the PLRs are available on the [Education Scotland website](#).

The 2013 survey focused on numeracy. Approximately 10,500 pupils participated in the survey, which took place in May 2013. The survey consisted of a set of written and practical assessments and a pupil questionnaire, with a further questionnaire completed by about 3,700 teachers. The assessments used in the survey were designed to assess the wide range of knowledge, skills, capabilities and attitudes across learning identified in the Curriculum [Experiences and Outcomes](#). They were designed to reflect the Curriculum for Excellence (CfE) requirements that pupils have achieved breadth, challenge and application of learning. The pupil questionnaire collected information on factors that are likely to affect learning, such as pupil attitudes and experience in class. The teacher questionnaire collected information on teachers' experiences of delivering numeracy across the Curriculum.

Following publication of the Experiences and Outcomes on 2 April 2009, CfE was increasingly adopted in primary schools from August 2009 and formally rolled out in all secondary schools from August 2010. This initially covered S1 only for the 2010/11 year, continuing upwards as the initial cohort progressed through secondary school. The P7 pupil cohort in the 2011 survey is the same as the S2 cohort in 2013. The pupils sampled to participate in the survey will not necessarily have been the same in each year.

The SSLN replaces the Scottish Survey of Achievement (SSA) which ran from 2004 to 2009. The SSLN has been developed to support assessment approaches for CfE, and so results are not comparable with the SSA. The guidance for assessment for CfE is set out in [Assessment for Curriculum for Excellence: Strategic vision and key principles](#), published in September 2009, and in [Building the Curriculum 5: A Framework for Assessment](#) and its supporting suite of publications, first published in January 2010. The SSLN has been under development since 2009, with new assessment materials being trialled in schools since then.

The SSLN is undertaken in partnership between the Scottish Government, Education Scotland, the Scottish Qualifications Authority (SQA), the Association of Directors of Education in Scotland (ADES) and local authorities.

1.2 Survey components

All mainstream publicly funded and independent schools were invited to participate in the SSLN. A sample size of two pupils at P4 and P7, and 12 pupils at S2 produced the target sample size of 4,000 pupils per stage. Pupils were selected at random. For more information on the sample design see Chapter 6: Background Information.

Pupils completed two booklets, each lasting about an hour, as well as taking part in a pupil-teacher interactive assessment. Each booklet contained short answer tasks, consisting of a single question, and a multi-item (extended) task, which was based on a source datasheet with multiple associated questions. All questions were worth one mark each. The exact score composition of the assessments differed between the stages but overall around 60 per cent of marks were derived from short answer tasks. At the P4 stage, each booklet contained 16 short answer tasks and one multi-item task consisting of six questions. For P7 and S2 pupils, each booklet contained 20 short answer tasks and a multi-item task consisting of eight questions.

All pupils also completed a pupil-teacher interactive assessment, which consisted of 12 questions for all stages and was worth 12 marks. This assessment included questions on mental maths, an 'estimation and rounding' task and a task on one of 'money', 'measurement' or 'chance and uncertainty'.

Tasks were either specifically developed for the SSLN by practising teachers and assessment experts, or, where previous SSA tasks were used or revised, these were re-assessed against Curriculum levels and Experiences and Outcomes. The assessments were constructed to include tasks with different degrees of challenge and across the range of [numeracy organisers](#) set out by the Curriculum at each level.

Pupils were assessed at the following Curriculum levels²:

P4	First Level
P7	Second Level
S2	Third Level

In contrast to the SSA, the SSLN does not assess pupils against other levels. So, for example, although pupils in P4 may be reported as 'performing very well at the first level', it is possible that some may be achieving many of the Second Level tasks as well; however, the SSLN does not capture this information. The principles of CfE are clear, however, that the Curriculum levels are not a barrier to pupils' progression in learning. In progressing through a level pupils must demonstrate breadth and depth of learning and be able to apply their learning in different and unfamiliar contexts.

² For definitions of the Curriculum levels, please see the [Education Scotland website](#).

1.3 Reporting SSLN results

The marks of participating pupils have been grouped into categories for ease of reporting. These categories were set in consultation with Education Scotland, SQA and teachers, based on an analysis of the tasks involved in the assessment. They refer to performance in the survey and are not meant to be used for general classroom reporting of performance. The following table gives the summary categories used for each performance level in the SSLN.

Percentage score in the SSLN	SSLN reporting category
75 per cent or more	Performing very well at the level
50 per cent or more, but less than 75 per cent	Performing well at the level
P4: less than 50 per cent, but more than 9 per cent P7: less than 50 per cent, but more than 19 per cent S2: less than 50 per cent, but more than 34 per cent	Working within the level
P4: 9 per cent or less P7: 19 per cent or less S2: 34 per cent or less	Not yet working within the level

The assessments are designed to cover the full range of the Curriculum at a given level and so pupils described as performing very well at the level might be expected, in general, to achieve at least 75 per cent of all tasks at their level. Pupils described as working within a level can achieve some of the outcomes expected for their age-group, but they are still working on achieving the others.

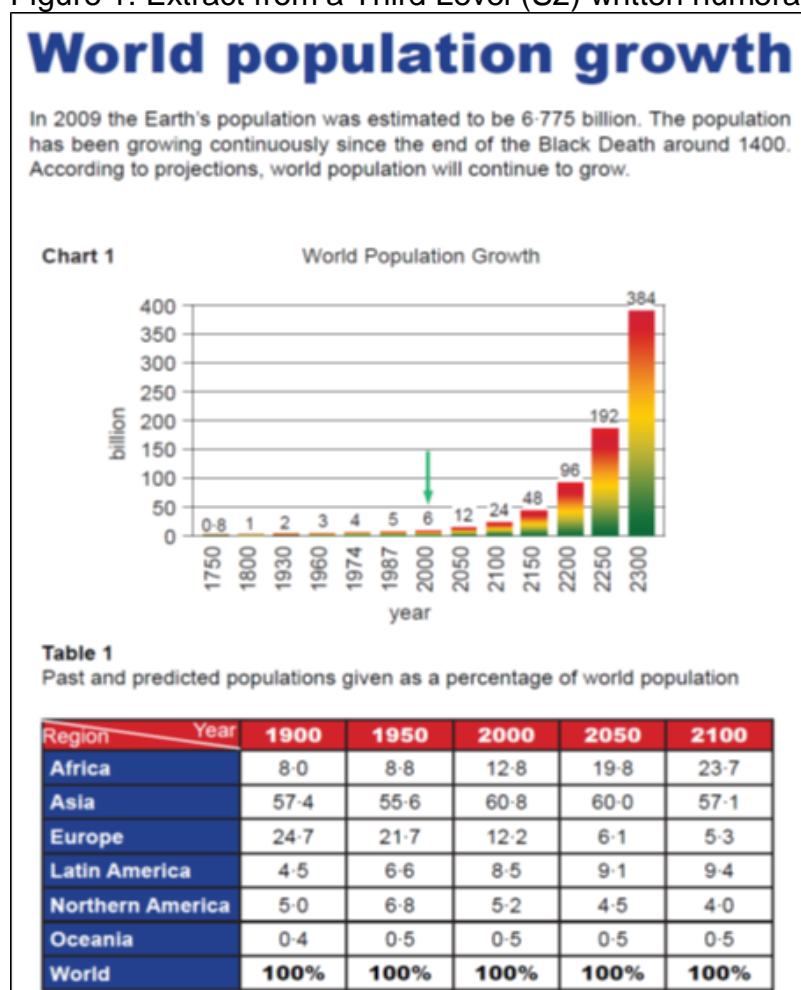
The differing cut-off scores between ‘working within the level’ and ‘not yet working within the level’ were determined by estimating the number of marks that could potentially be obtained in the assessment using only skills acquired at the previous level. There were more tasks in S2 which used Second Level skills, and relatively few P4 tasks which used Early Level skills.

SSLN results are presented as estimates, as the SSLN surveys a sample of pupils, not the whole population. Therefore there is an element of uncertainty around the estimates, denoted by confidence intervals. For more information on calculation and interpretation of confidence intervals please see Chapter 6: Background information.

Chapter 2: Assessment of numeracy

Figure 1 provides an illustration of a question taken from one of the Third Level written booklets. This is a multi-item style task and focuses on the 'data and analysis' and 'fractions, decimal fractions and percentages' organisers. The figure contains an extract of the data sheet and an example of one of the accompanying questions.

Figure 1: Extract from a Third Level (S2) written numeracy multi-item task



- B4** a. In 2100 what region is expected to have approximately one tenth of the world's population?

Answer: _____

10794

- b. How many billion people is this? Calculate one tenth of the world population figure for 2100.
(Use the world population figure from Chart 1.)

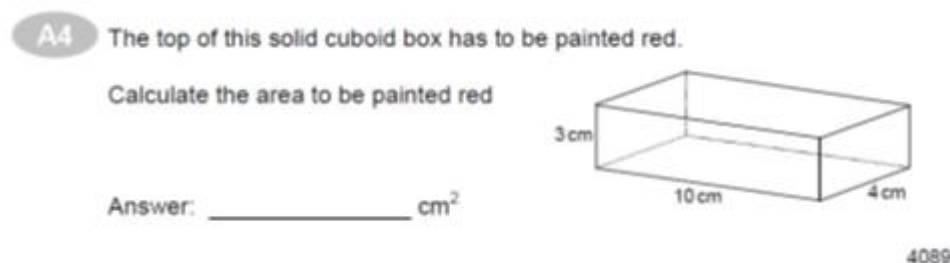
Answer: _____ billion

Working

10795

Figure 2 provides an illustration of a short answer style task taken from one of the Second Level written numeracy booklets. This task focuses on the ‘measurement’ organiser whilst making use of ‘number and number processes’ skills.

Figure 2: Example of a Second Level (P7) question from a written numeracy booklet



The following analysis is taken from the results of pupils completing all three elements of the assessment (two written booklets and one pupil-teacher interaction). Effective sample sizes on this basis were 3,411 pupils in P4, 3,460 in P7 and 3,690 in S2. Results were weighted to account for different school sizes, a small number of non-participating schools and gender and deprivation differences between the sample and the population.

2.1 Overall distribution

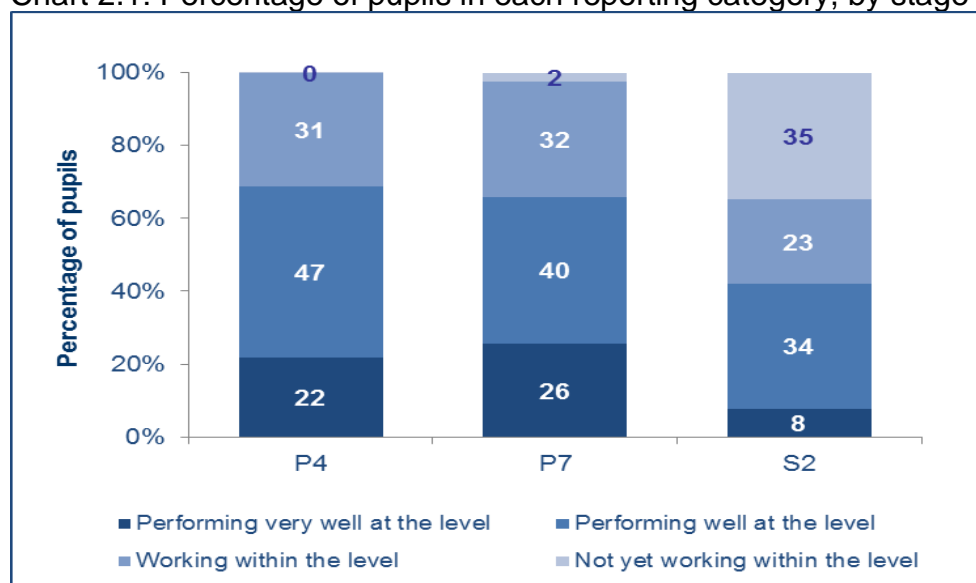
Chart 2.1 presents the percentages of P4, P7 and S2 pupils in each attainment reporting category as defined in Section 1.3.

At P4, about 69 per cent of pupils performed well or very well when assessed at the relevant Curriculum level for their stage, meaning they achieved at least 50 per cent when assessed against First Level. Performance was similar for P7 pupils, where about 66 per cent performed well or very well at the relevant Curriculum level for their stage. There was lower performance at S2, where about 42 per cent of pupils performed well or very well at the level.

The proportion of pupils who performed very well at the relevant Curriculum level was higher in the primary stages than at S2, where about 22 per cent of P4 and 26 per cent of P7 pupils performed very well compared to eight per cent at S2.

In addition, the percentage of pupils not yet working within their level was very small for the primary school stages but markedly increased at the S2 stage. Less than one per cent of P4 pupils and about two per cent of P7 pupils were not yet working at their respective level, rising to 35 per cent at S2.

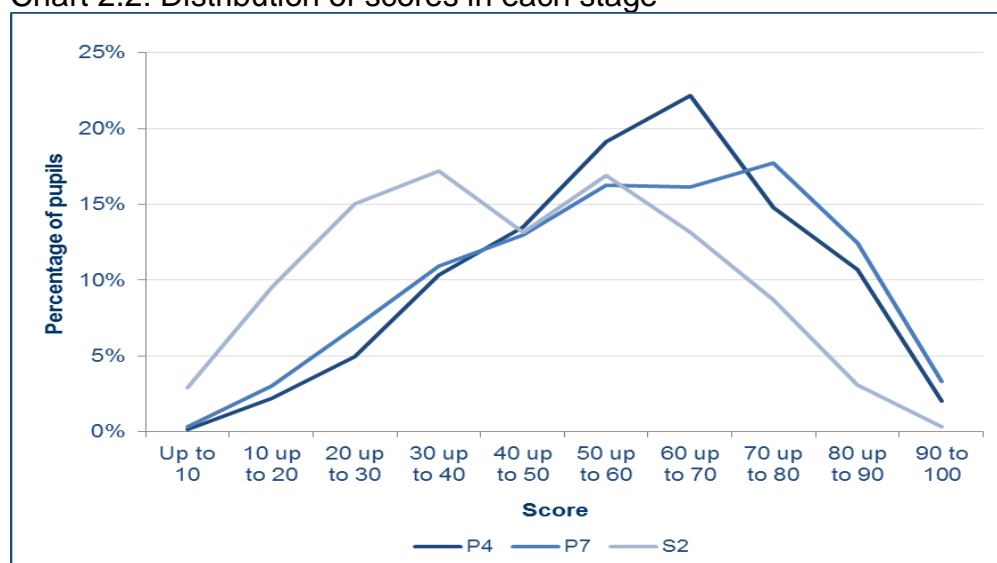
Chart 2.1: Percentage of pupils in each reporting category, by stage



The difference in performance at the primary stages and at S2 as highlighted in these results is consistent with other evidence. A drop in performance associated with the transition from late primary and early secondary has been documented previously in the education sector, both in Scotland and in many other education systems. This is apparent in the current results between the P7 and S2 stages. Whilst there are only two years of schooling between these stages, the results show a substantially lower proportion of pupils working well or very well at the respective level by S2, though it should be noted that pupils are expected to reach Curriculum level 3 (the level at which S2 pupils are assessed) by the end of S3, rather than S2.

Chart 2.2 shows the distribution of scores for each of the three stages assessed. The chart shows that P4 and P7 scores generally followed a similar pattern of distribution, with half of pupils at both stages achieving a score of 60 per cent or over. Performance was noticeably lower at S2, with 25 per cent of S2 pupils achieving a score of 60 per cent or over.

Chart 2.2: Distribution of scores in each stage



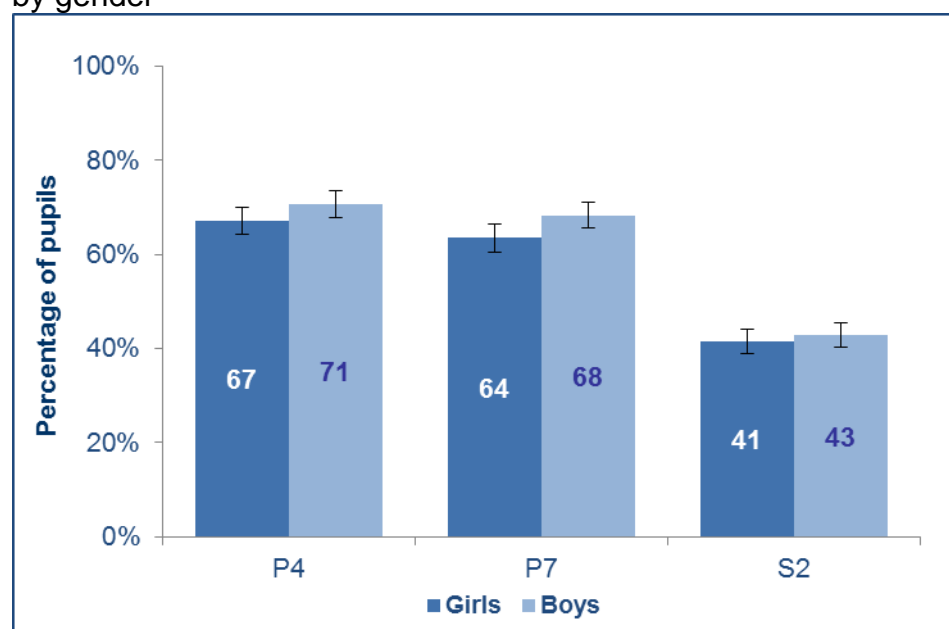
Note: '10 up to 20' includes 10 and all values up to but not including 20, etc.

2.2 Attainment by Gender

Of the three stages assessed, there was a statistically significant difference between girls and boys who performed well or very well at the P7 stage, with boys outperforming girls by about five percentage points. The differences observed in the proportions of girls and boys who performed well or very well were not statistically significant at P4 and S2.

The difference observed in pupil performance between the primary stages and the S2 stage overall is also evident in the results for both girls and boys. The proportion of both girls and boys who performed well or very well at S2 was statistically significantly lower than in P4 and P7. This suggests both genders are affected by the challenge of transition, as observed here and in other data.

Chart 2.3: Percentage of pupils performing well or very well at the relevant level, by gender



Whilst there was no evidence of a gender difference at the S2 stage in the current results, gender differences in the mathematical ability of Scottish secondary school children have been documented recently in the OECD's Programme for International Student Attainment (PISA). PISA surveys 15 year olds, who are mostly S4 pupils. Results from the most recent surveys, completed in 2009 and 2012, found that boys performed statistically significantly better than girls in the maths assessment.

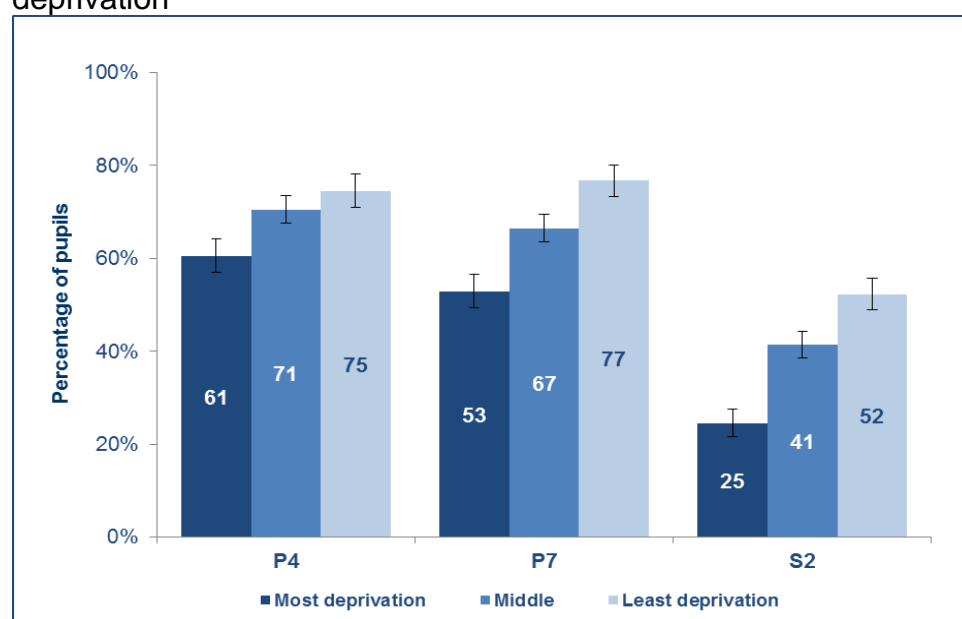
2.3 Attainment by Deprivation

There are three deprivation categories in the SSLN: the least deprived 30 per cent of datazones, the middle 40 per cent and the most deprived 30 per cent. These are based on the [Scottish Index of Multiple Deprivation \(SIMD\) 2012](#) and pupils are assigned to a category according to their home postcode.

Chart 2.4 displays the percentage of pupils who performed well or very well by deprivation category and stage. This shows that pupils from areas of least deprivation had statistically significantly higher performance than pupils from areas of most deprivation at all stages.

The effect of deprivation seems to have an increased adverse effect at the P7 and S2 stages, compared to P4. The largest disparities in performance between the least deprived pupils and pupils from the middle group were observed at P7 (10 percentage points) and S2 (11 percentage points), compared to 4 percentage points at P4. Hence, while performance of the middle group is statistically similar to performance of the least deprived pupils at P4, the same cannot be said of P7 or S2.

Chart 2.4: Percentage of pupils performing well or very well at the relevant level, by deprivation

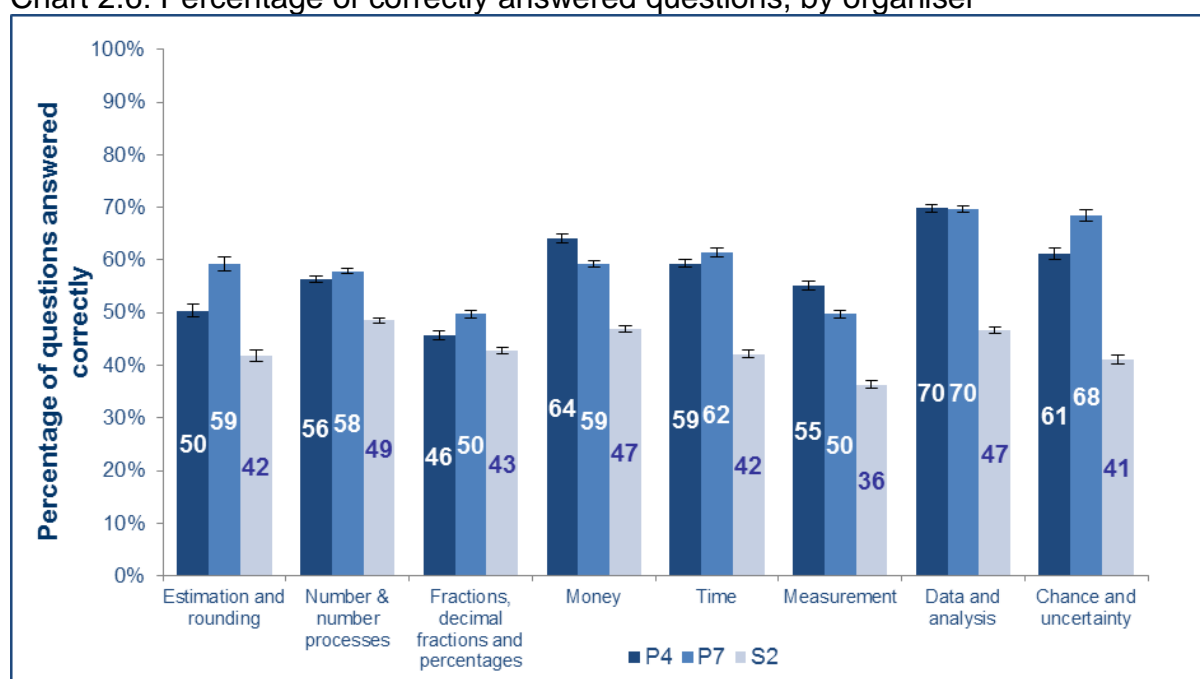


2.4 Attainment by numeracy organiser and type of task

Pupils in P4 gave the highest percentage of correct answers to questions which assessed 'data and analysis', with 70 per cent of these types of questions answered correctly. At P7, a higher percentage of items assessing either 'data and analysis' or 'chance and uncertainty' were answered correctly, compared to items on other organisers. At the S2 level, pupils gave the highest percentage of correct answers to questions where 'number and number processes' was the main topic being assessed, with 49 per cent of these questions answered correctly.

Performance at the S2 stage was lower across all organisers assessed when compared to the primary stages. The greatest differences in performance between P7 and S2 were seen in organisers 'chance and uncertainty' (68 per cent at P7, 41 per cent at S2), 'data and analysis' (70 per cent at P7, 47 per cent at S2) and 'time' (62 per cent at P7, 42 per cent at S2).

Chart 2.6: Percentage of correctly answered questions, by organiser



Section 1.2 sets out the nature of the assessment and its component parts. Pupils in P4 were most successful when completing the multi-item task, with 65 per cent of these tasks being completed correctly, compared to 57 per cent and 56 per cent of questions answered correctly in the interactive and short answer tasks respectively. In P7 and S2, the interactive questions had the highest success rate with 65 per cent and 49 per cent of these being correctly answered respectively. The short answer tasks were found to be the most challenging by both P7 and S2 pupils with 55 and 42 per cent of questions being answered correctly, respectively. This success rate for S2 pupils in all question formats was similar to the pattern seen in the rest of the survey.

2.5 Mental Maths

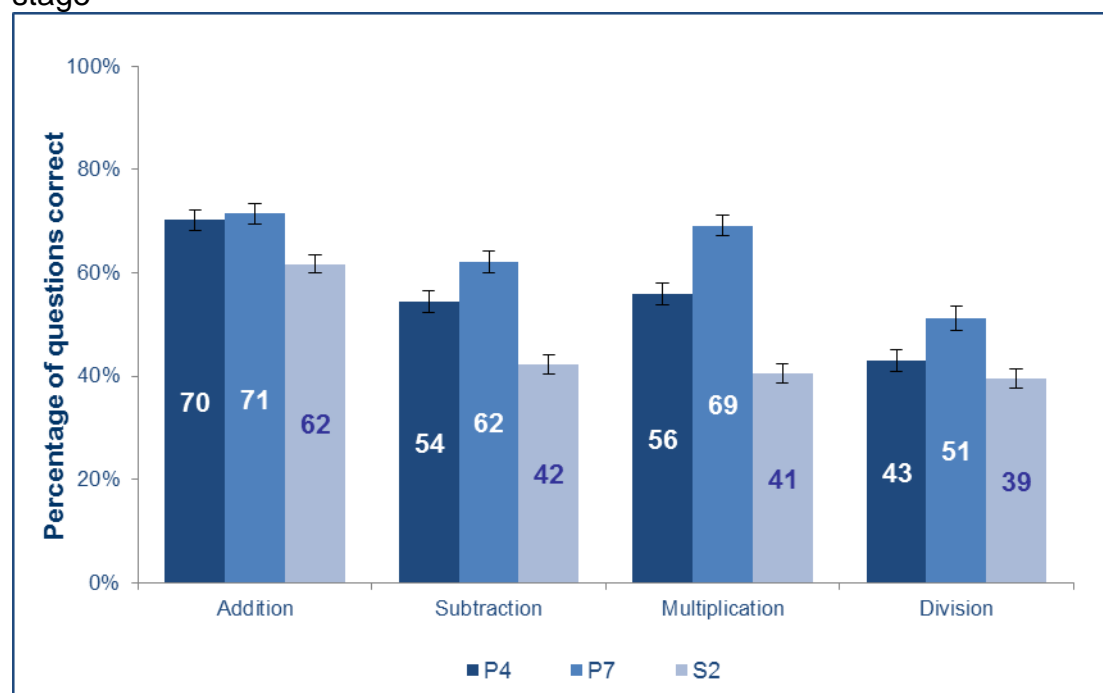
The first section of the pupil-teacher interaction assessment included four mental maths questions, one for each of addition, subtraction, multiplication and division. For two of these questions, the calculations were written on prompt cards for the pupils to allow them to see the numbers written down. The other two questions were presented orally by the teacher; the pupil could not see the numbers written down.

At all stages, the percentage of correct answers was highest for mental maths questions where the operator was addition, with 70 per cent (P4), 71 per cent (P7) and 62 per cent (S2) of these questions being answered successfully, as shown in Chart 2.7.

At P4 and S2, the proportion of addition questions answered correctly was notably larger than the next highest: multiplication at P4 (56 per cent correct answers) and subtraction at S2 (42 per cent correct answers). At P7, addition was closely followed by multiplication (69 per cent). At S2, performance in subtraction, multiplication and division were all of a similar magnitude at around two fifths of answers correct.

Questions on division were the most challenging for all pupils, with success rates of 43 per cent (P4), 51 per cent (P7) and 39 per cent (S2).

Chart 2.7: Percentage of mental maths tasks answered correctly, by operator and stage



Chapter 3: Numeracy attainment over time

A key objective of the SSLN is to monitor national performance over time in numeracy at the P4, P7 and S2 stages. The SSLN assesses numeracy and literacy in alternate years, with the first numeracy survey taking place in 2011. It is therefore now possible to compare performance between the 2011 and 2013 survey cycles. This chapter details the methodology used to assess numeracy attainment over time and provides the trends in performance for the key measures from the survey.

3.1 Methodology

All analysis is based on the results of pupils who completed all three elements of assessment (two written booklets and the pupil-teacher interaction). The effective sample size was 11,238 pupils for the 2011 survey (3,679 in P4, 3,682 in P7 and 3,877 in S2) and 10,561 pupils for the 2013 survey (3,411 in P4, 3,460 in P7 and 3,690 in S2). Results were weighted to account for different school sizes, the small number of non-participating schools and gender and deprivation³ differences between the sample and the population.

The SSLN is designed so that a number of items can be released in order to provide examples of the tasks pupils are asked to undertake. They are included, for example, in Education Scotland's PLRs. Released items need to be replaced for future surveys, therefore there were a proportion of assessment booklets that were not consistent between 2011 and 2013.

Exploratory analysis on the 2011 and 2013 data was undertaken which confirmed that the results are comparable. Numeracy attainment results were produced on two bases; firstly on all assessment booklets and secondly excluding booklets which had been released or replaced between cycles. A series of in-year and between year comparisons showed that excluding released or replacement booklets did not affect the overall picture of pupil performance.

Therefore it was concluded that the item release and replacement policy had produced comparable survey designs as planned. As a result, the trend data in this report and the supplementary tables are based on an analysis of all booklets in either 2011 or 2013. Statistical significance tests were used to test for significant differences between 2011 and 2013 results.

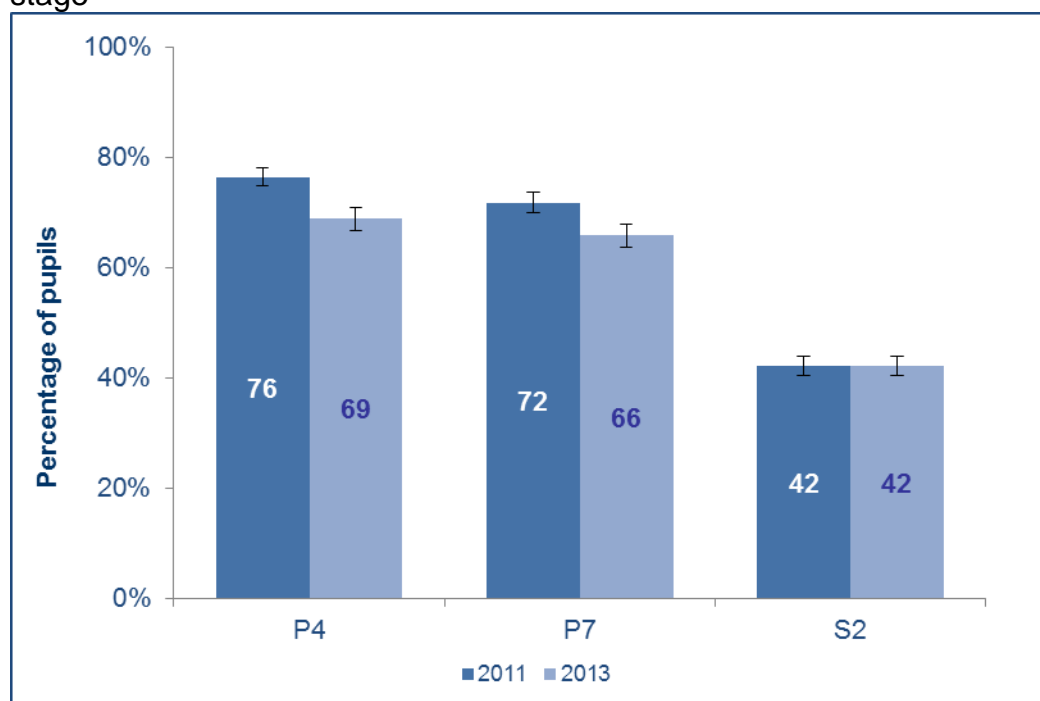
³ It should be noted that the deprivation categories were calculated based on the version of the SIMD applicable at the time of publication (i.e. SIMD 2009 for SSLN 2011 and SIMD 2012 for SSLN 2013).

3.2 Overall distribution

Chart 3.1 shows the percentage of pupils who performed well or very well at the relevant level in 2011 and 2013. The overall pattern shown in the 2013 data was similar to that seen in 2011, with performance at the S2 stage lower than in the primary school stages.

At both primary stages, there were statistically significantly fewer pupils who performed at the higher levels of attainment than in 2011. At P4, 69 per cent of pupils performed well or very well in 2013, lower than the 2011 figure of 76 per cent. Similarly, at P7, 66 per cent of pupils performed well or very well in 2013 compared to 72 per cent in 2011. Virtually all of the change is attributable to fewer pupils performing very well at their Curriculum level, with no statistically significant change in the proportions performing well at the level in either stage. The difference in S2 performance between 2011 and 2013 was negligible.

Chart 3.1: Percentage of pupils performing well or very well at the relevant level, by stage



There was a three percentage point increase in the proportion of pupils not yet working within the level at S2, rising from 32 per cent in 2011 to 35 per cent in 2013 and a one percentage point increase at P7 (from 1.6 per cent to 2.5 per cent). Both of these changes were statistically significant. There was no change at P4 (0.2 per cent).

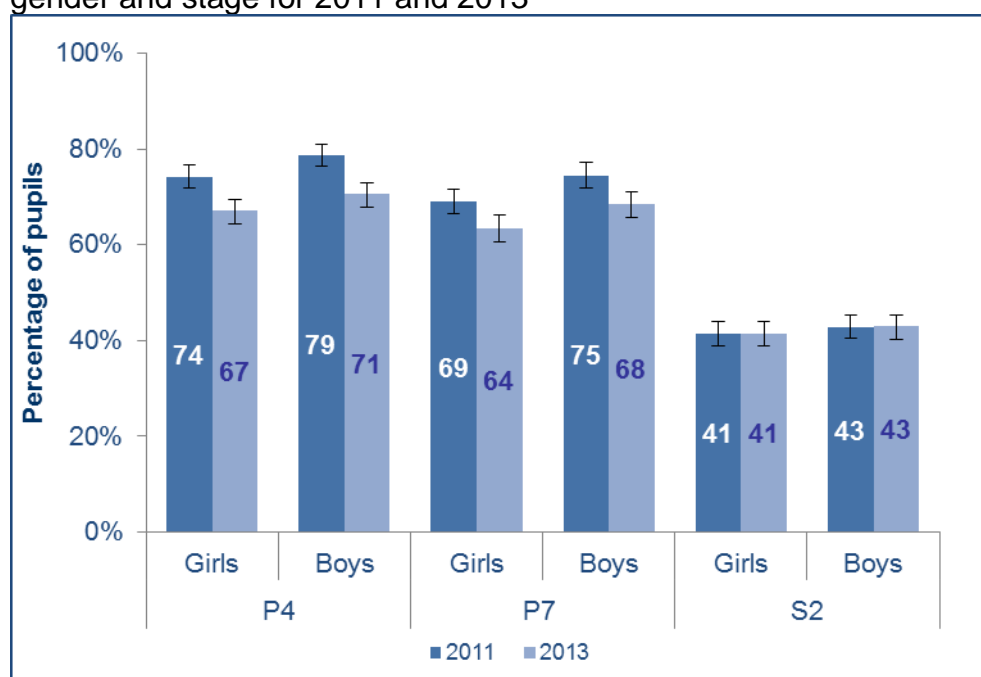
3.3 Attainment by Gender

Chart 3.2 shows that fewer P4 and P7 girls and boys performed well or very well in 2013 than in 2011. For P4 girls, performance was seven percentage points lower in 2013 than 2011 and for P4 boys, this difference was eight percentage points. At the P7 stage, performance in 2013 was five percentage points lower for girls and six percentage points lower for boys compared to 2011.

These changes were similar to the pattern observed for all pupils and show that the lower performance at these stages in the 2013 survey cycle was not unique to either girls or boys.

The proportion of S2 girls and boys who performed well or very well at their relevant Curriculum level was very similar between 2011 and 2013, with negligible differences present for both genders. There was a statistically significant increase in the percentage of girls in S2 who were not yet working within their level, rising from 32 per cent in 2011 to 37 per cent in 2013. The percentage of boys in S2 not yet working within their level was 32 per cent in 2011 and 33 per cent in 2013. This change was not statistically significant.

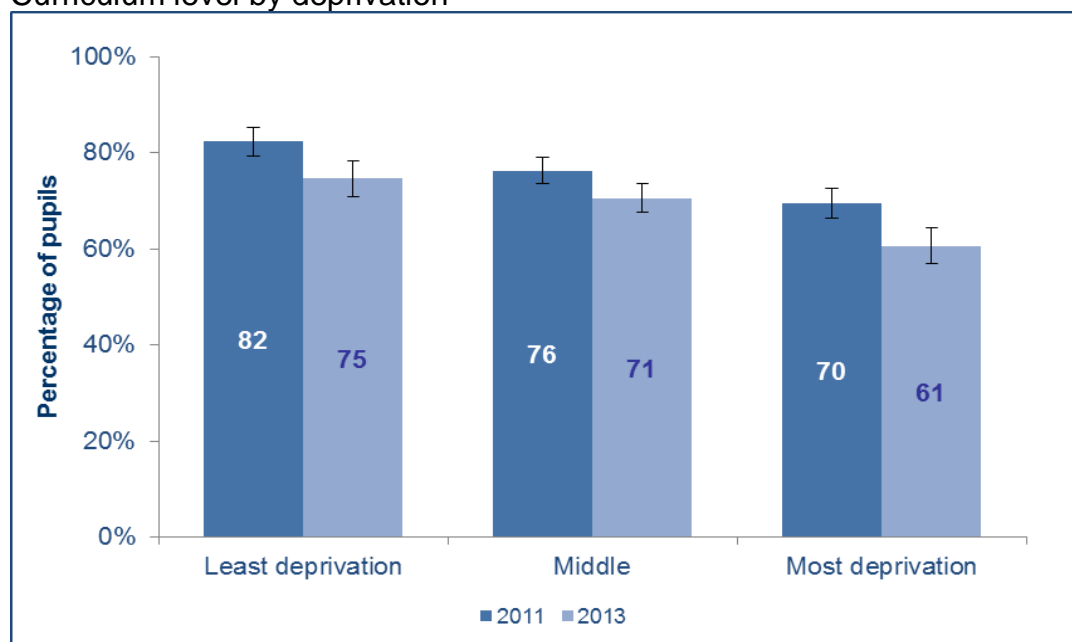
Chart 3.2: Percentage of pupils performing well or very well at the relevant level, by gender and stage for 2011 and 2013



3.4 Attainment by Deprivation

Chart 3.3 displays the percentage of P4 pupils that performed well or very well at the respective Curriculum level by deprivation category. This chart shows that the lower levels of performance rated well or very well between 2011 and 2013 were statistically significant across all three deprivation categories at this stage. The biggest difference was seen in the most deprived category, where there was a nine percentage point decrease between the two surveys.

Chart 3.3: Percentage of P4 pupils performing well or very well at the relevant Curriculum level by deprivation



Similar charts for P7 and S2 pupils are available in the supplementary tables.

At P7, there were statistically significant decreases in the percentage of pupils in the most deprived and middle categories that performed well or very well in 2013 compared to 2011. The difference in the least deprived category between 2011 and 2013 was negligible.

There were no statistically significant differences in the proportion of S2 pupils who performed well or very well between the two surveys. However, there was a statistically significant increase in the proportion of S2 pupils in the most deprived category who were not yet working within their respective Curriculum level, with an increase from 44 per cent in 2011 to 52 per cent in 2013.

The results show that there has been no change in the performance gap between the least and most deprived pupils since the last numeracy survey at both P4 and S2. At P7 the gap (between pupils performing well or very well) increased by eight percentage points. The PISA 2012 Scotland results showed that there had been a reduction in the performance gap in maths between disadvantaged and less disadvantaged 15 year old pupils compared to the 2009 PISA survey. However, PISA and the SSLN survey different stages within secondary schools.

Whilst SIMD is used to derive the deprivation categories for SSLN, PISA utilises the Index of Economic, Social and Cultural Status (ESCS) to analyse social background. The ESCS is based on the responses pupils provide in a background questionnaire. These two indices are not directly comparable and it is possible that the differences in the findings between the two surveys are in part due to the use of these indices.

3.5 Attainment by numeracy organiser

Attainment in P4 pupils was lower across all organisers in 2013 compared to 2011, except for 'chance and uncertainty' where performance was similar to 2011. The largest decrease was in questions relating to 'estimation and rounding', where 50 per cent of questions were answered correctly in 2013 compared to 58 per cent in 2011. In addition, performance in 'number and number processes', 'money', 'time' and 'measurement' was around five percentage points lower at P4 in 2013 compared to 2011.

There was a similar pattern present at P7 with lower attainment seen in 2013 for six out of the eight organisers. The exceptions were 'chance and uncertainty', where performance was similar to 2011, and 'estimation and rounding', where the percentage of questions answered correctly increased from 57 per cent in 2011 to 59 per cent in 2013.

The differences between S2 attainment in 2011 and 2013 were generally smaller than those seen in the primary stages. There were statistically significant differences for half of the organisers between the two surveys at this stage. The percentage of questions answered correctly in 'fractions, decimal fractions and percentages' increased between the two surveys, whereas there was a decrease in 'number and number processes', 'time' and 'data and analysis'.

Chapter 4: Pupil questionnaire

All pupils participating in the SSLN were asked to complete a questionnaire which focused on factors that are likely to affect learning, such as pupil attitudes and experiences in class.

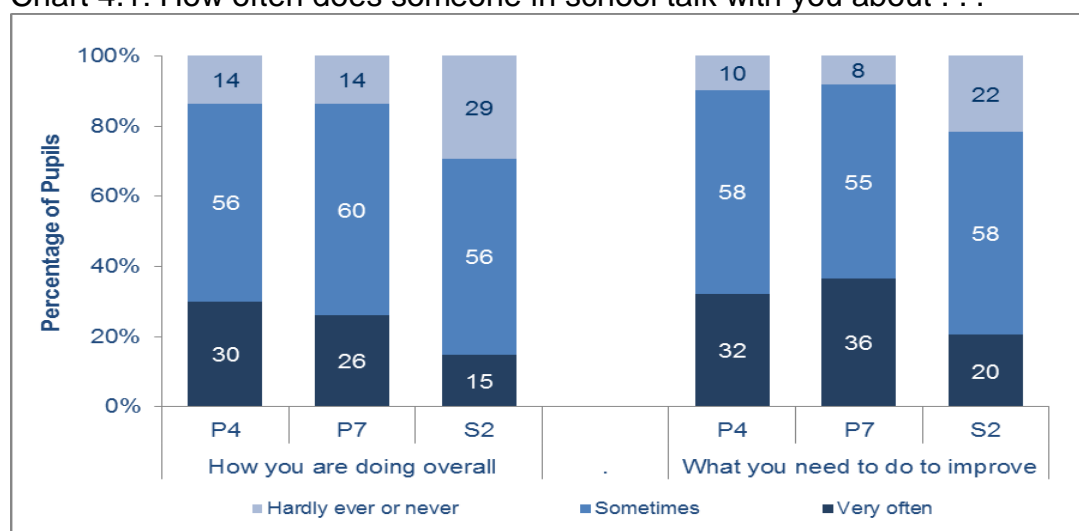
4.1 Activities in school

Pupils were asked how often they participate in a range of activities in their class. Across all stages, the activities in which the highest percentage of pupils reported they participated very often were 'listen to the teacher talk to the class about a topic' (64, 68 and 65 per cent in P4, P7 and S2 respectively) and 'work on your own' (59, 56 and 57 per cent in P4, P7 and S2). A high percentage of pupils in P7 (60 per cent) also reported that they discussed what they were learning very often. There has been a statistically significant decrease in the percentage of P4 and P7 pupils reporting that they use computers very often between the 2011 and 2013 surveys (34 to 24 per cent in P4 and 38 to 31 per cent in P7). However, there was a statistically significant increase between the two surveys in the same question responses for S2 pupils from 14 to 21 per cent.

Pupils were also asked about their teachers' practices. The most commonly reported teaching practices being undertaken very often were 'tell you what you are going to learn before you start' (83, 90 and 77 per cent in P4, P7 and S2 respectively) and 'encourage you to work hard' (71, 82 and 64 per cent in P4, P7 and S2 respectively). Over three quarters of P7 pupils reported that their teacher helps them to understand how they can do better very often. Similar proportions of P4 and S2 pupils reported that teachers go too slowly as too fast – 11 per cent did this very often in each case in P4 and under 15 per cent in S2. In P7, more pupils reported teachers going through work too slowly than too fast.

Pupils were also asked how often someone in school talked with them about their learning, Chart 4.1 illustrates the results. Over a quarter of pupils in primary stages reported that they received feedback on performance and improvement very often, but this reduced to less than a quarter in S2.

Chart 4.1: How often does someone in school talk with you about . . .

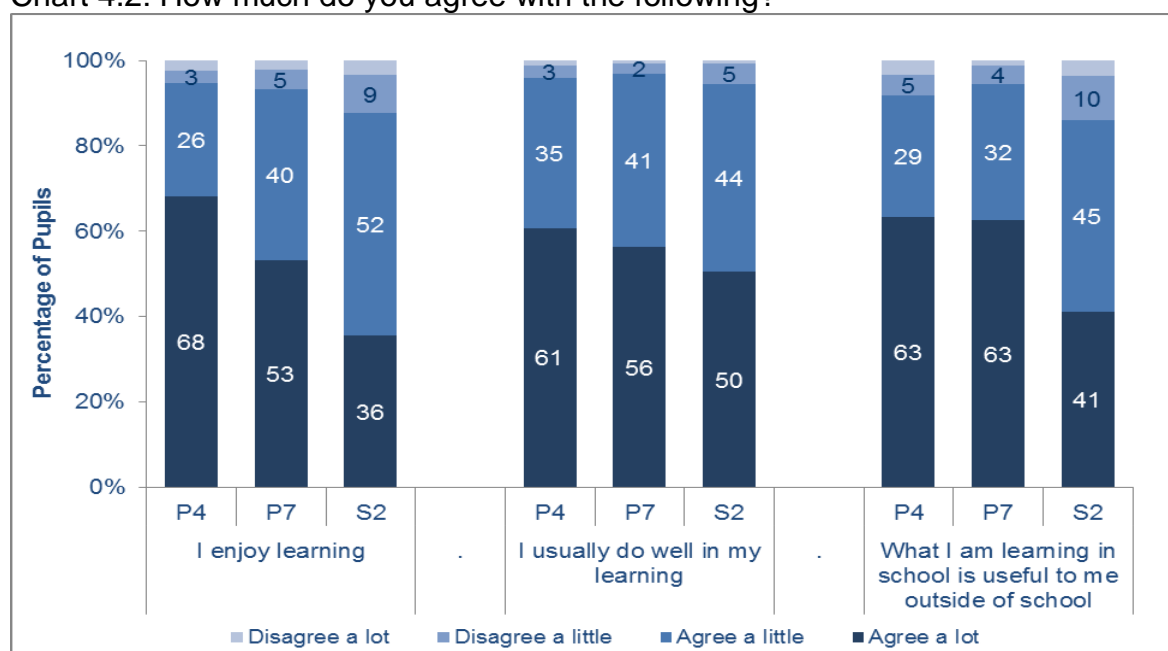


4.2 Attitudes to learning and numeracy

Pupils were asked a series of questions about their attitude towards learning in general, including how much they enjoy it, what use they think it is, and whether they think they are good at learning. Chart 4.2 illustrates the answers to these three questions.

Enjoyment of learning was high throughout the survey stages, though the strength of this agreement reduced slightly in P7 and further in S2. The proportion of pupils reporting that they usually did well remained steady, with over 90 per cent of pupils at each stage agreeing either a lot or a little. Sixty-three per cent of pupils in P4 and P7 and 41 per cent of S2 pupils strongly agreed that what they are learning in school is useful to them outside of school. This rises to over 85 per cent for all stages if pupils agreeing a little are also included.

Chart 4.2: How much do you agree with the following?

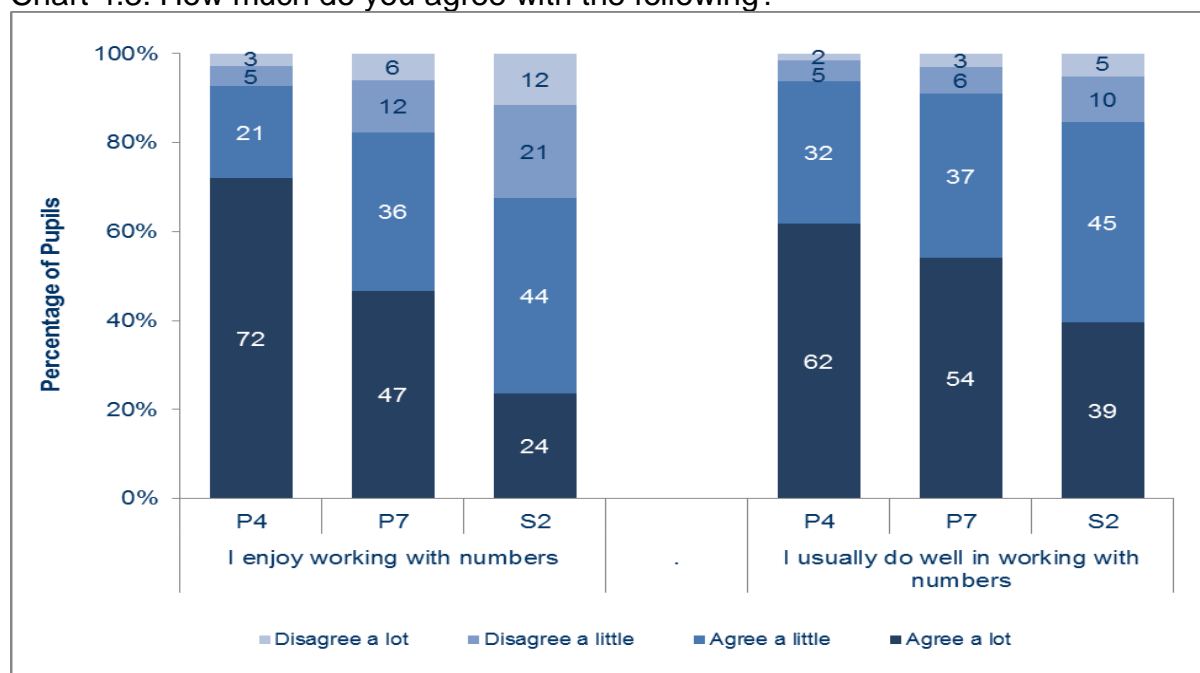


Almost all pupils at all three stages agreed with the statements 'I want to do well in my learning' (98 per cent in P4 and P7 and 97 per cent in S2) and 'I am interested in learning about different things' (97 per cent in P4 and P7 and 95 per cent in S2). The proportion of S2 pupils agreeing with the statement 'learning is boring' showed a statistically significant decrease between the two surveys (44 to 37 per cent).

Across all stages, the proportion of pupils that agreed with the statement 'learning is harder for me than others in my class' showed a statistically significant increase between the 2011 and 2013 surveys (45 to 53 per cent in P4, 35 to 40 per cent in P7 and 36 to 39 per cent in S2).

Pupils were also asked about working with numbers. Chart 4.3 illustrates similar patterns to learning in general. The proportion of S2 pupils that agreed with the statement 'I learn things quickly when working with numbers' has shown a statistically significant increase between the 2011 and 2013 surveys (63 to 70 per cent).

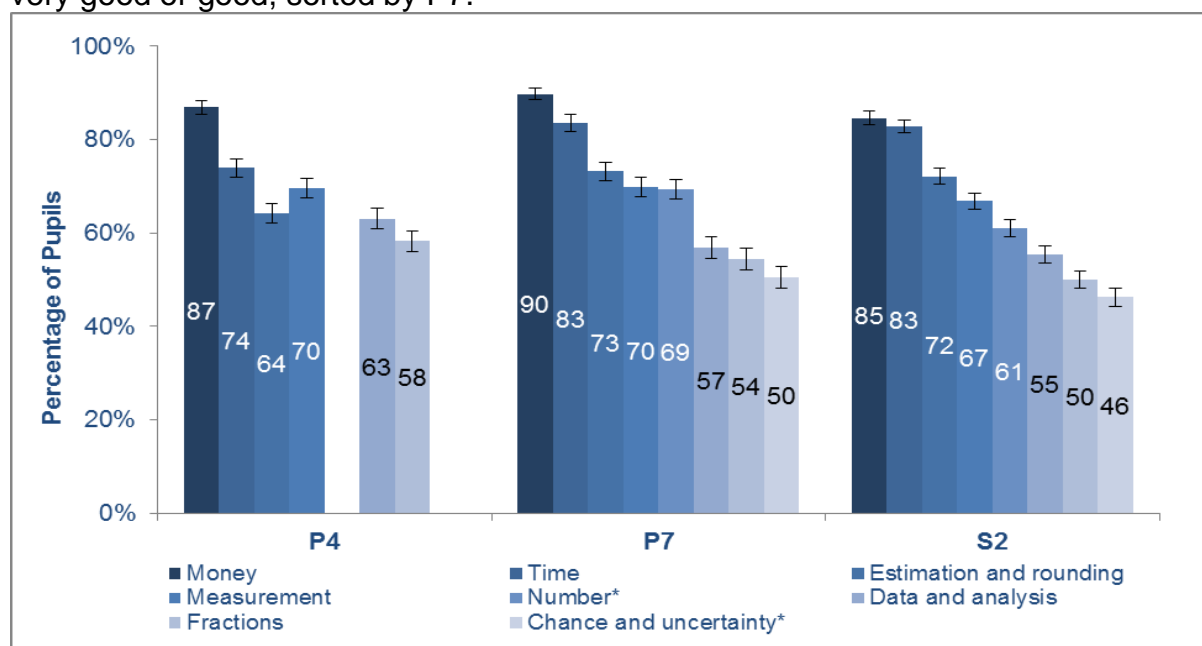
Chart 4.3: How much do you agree with the following?



Pupils were asked about perceptions of their abilities in each of the numeracy organisers. Chart 4.4 shows the proportion of pupils answering very good or good and the subjects are ordered according to performance at P7. 'Chance and uncertainty' and 'fractions, decimal fractions and percentages' were consistently reported as the areas where fewest pupils thought they were good, while 'money' and 'time' were generally the most favoured.

The proportion of S2 pupils reporting that they thought they were very good or good showed a statistically significant increase between the 2011 and 2013 surveys in seven of the nine numeracy areas they were asked about. These included 'fractions' (45 to 50 per cent), 'data and analysis' (50 to 55 per cent), 'chance and uncertainty' (40 to 46 per cent) and 'numeracy in general' (62 to 70 per cent). However, the proportion of P7 pupils responding that they thought they were very good or good at 'data and analysis' showed a statistically significant decrease between the two surveys (from 62 to 57 per cent).

Chart 4.4: How good do you think you are at the following? Percentage responding very good or good, sorted by P7.



*P4 pupils were not asked about the 'chance and uncertainty' and 'number' organisers.

4.3 Activities outwith school

Pupils were also asked about their activities outwith school. Around 50 per cent of primary pupils reported they were very often involved in a group or a club where they live. This drops to 40 per cent for S2 pupils. The proportions of P7 and S2 pupils reporting that they are involved in groups or clubs very often has shown a statistically significant increase between the 2011 and 2013 surveys (46 to 51 per cent in P7 and 34 to 40 per cent in S2).

Older pupils were more likely to respond that they used money very often than those at earlier stages (43 per cent in P4, 57 per cent in P7 and 69 per cent in S2). There was a statistically significant increase in the proportion of S2 pupils reporting that they used money very often, from 59 per cent in 2011 to 69 per cent in 2013.

Between 30 and 40 per cent of pupils at all stages reported watching television and DVDs very often, compared to over half of pupils at all stages reporting that they play sports very often. The proportion of pupils at all stages reporting that they watch television and DVDs very often has shown a statistically significant decrease between 2011 and 2013 (41 to 35 per cent in P4, 44 to 32 per cent in P7 and 49 to 40 per cent in S2). There was a similar pattern in relation to playing computer games (39 to 31 per cent in P4, 41 to 34 per cent in P7 and 40 to 33 per cent in S2 respectively).

The proportion of pupils reporting that they use the internet very often increases noticeably as stage increases; from 42 per cent of P4 pupils to 80 per cent of S2 pupils. The proportion of primary pupils reporting that they use the internet very often has also shown a statistically significant decrease between the 2011 and 2013 surveys (49 to 42 per cent in P4 and 67 to 63 per cent in P7).

The proportion of pupils reporting that they do homework very often decreases as stage increases, though this may be due to different expectations of what is considered very often by pupils in each of these stages.

4.4 Links between attitudes and attainment

The results showed some evidence of a difference between pupils' views of their abilities in numeracy and their actual performance in the SSLN. To illustrate this Figure 3 shows the various organisers ordered in two different ways for each stage. Firstly the organisers in the 'View' column are ordered based on the pupils' responses when they were asked how good they thought they were at each organiser, with the organiser that most pupils thought they were very good or good at at the top of the list. In the 'Performance' column, the organisers are ordered by the percentage of questions answered correctly from highest to lowest (see Section 2.4).

For example, 'fractions' was the area that fewest P4 pupils thought they were either very good or good at and this was the area that they performed worst in. Only 57 per cent of pupils in P7 reported that they thought they were very good or good at 'data and analysis', but this was in fact the area that P7 pupils performed best in. Over four fifths of S2 pupils reported that they were very good or good at 'time', however just over two fifths of questions on 'time' were answered correctly by S2 pupils. The overall pattern is consistent with the 2011 SSLN results.

Figure 3: Difference between pupils' attitudes to numeracy organisers and performance⁴

P4		P7		S2	
View	Performance	View	Performance	View	Performance
Money (87%)	Data & Analysis (70%)	Money (90%)	Data & Analysis (70%)	Money (85%)	Number (49%)
Time (74%)	Money (64%)	Time (83%)	Chance & Uncertainty (68%)	Time (83%)	Money; Data & Analysis (47%)
Measurement (70%)	Time (59%)	Estimation & Rounding (73%)	Time (62%)	Estimation & Rounding (72%)	
Estimation & Rounding (64%)	Measurement (55%)	Measurement (70%)	Money; Estimation & Rounding (59%)	Measurement (67%)	Fractions (43%)
Data & Analysis (63%)	Estimation & Rounding (50%)	Number (69%)		Number (61%)	Estimation & Rounding; Time (42%)
Fractions (58%)	Fractions (46%)	Data & Analysis (57%)	Number (58%)	Data & Analysis (55%)	
		Fractions (54%)	Fractions; Measurement (50%)	Fractions (50%)	Chance & Uncertainty (41%)
		Chance & Uncertainty (50%)		Chance & Uncertainty (46%)	Measurement (36%)

⁴ P4 pupils were not asked about their views on 'chance and uncertainty' and 'number'.

Chapter 5: Teacher questionnaire

The teacher questionnaire asked teachers to answer questions on their numeracy teaching experiences and opinions. This was distributed to all P4 class teachers in half of primary schools and all P7 teachers in the other half of primary schools. In secondary schools questionnaires were given to ten teachers: two S2 maths teachers and two S2 teachers in each of four other broad curriculum groupings:

- Science and Technology
- Social Studies, Religious & Moral Education (RME) and Health & Wellbeing
- Expressive Arts and Languages
- Additional Support Needs (ASN)

There were three versions of the questionnaire (primary, secondary maths and secondary non-maths) though many of the questions were consistent across the three versions.

It should be noted that introduction of CfE in secondary schools started with S1 in 2010/11 and this continued upwards as that cohort progressed through the stages. The 2013 questionnaire was therefore the first time where secondary school teachers completed the survey whilst using the Experiences and Outcomes with their S2 classes. The 2011 survey still acts as a benchmark of their views and experiences.

5.1 Classroom activities and resources

Teachers were asked how often pupils in their classes spend time doing a range of activities. Full results are available in the supplementary data tables. The activities which the highest percentages of teachers reported pupils undertook on most days were 'being taught with the whole class together', 'working quietly on their own' and 'talking about what they are learning in pairs or in groups'.

There was a reported increase in how often pupils in primary classes spend time 'explaining in their own words how they solved a problem', with 54 per cent of teachers in 2013 reporting that pupils spend time undertaking this activity on most days, compared to 44 per cent in 2011. There was also an increase in the proportion of secondary maths teachers reporting that pupils spend time on this activity most days or most weeks, from 87 per cent in 2011 to 92 per cent in 2013. This was similar to the change reported in secondary non-maths teachers, from 62 per cent in 2011 to 72 per cent in 2013.

There were increases in the proportion of teachers stating pupils in secondary schools spend time 'finding out things by exploring or investigating' and 'interpreting and analysing information' between 2011 and 2013. In 2011, 37 per cent of secondary maths teachers reported that pupils spend time 'finding out things by exploring or investigating' on most days or most weeks but this increased to 50 per cent in 2013. The percentage of secondary maths pupils 'interpreting and analysing information' at least most weeks increased from 72 per cent in 2011 to 81 per cent in 2013. There were similar increases for these two activities reported by secondary non-maths teachers.

Primary and secondary maths teachers were asked about the numeracy resources which they make use of. The most common resources that were utilised daily were commercially produced materials (e.g. textbooks/software packages), Experiences and Outcomes, materials developed by the teachers and interactive whiteboards. The proportion of secondary maths teachers who use Experiences and Outcomes at least most weeks increased from 68 per cent in 2011 to 91 per cent in 2013, and the use of 'other nationally available CfE advice' rose from 40 per cent in 2011 to 66 per cent in 2013. The increased utilisation of these resources is to be expected as CfE is rolled out throughout the secondary stages.

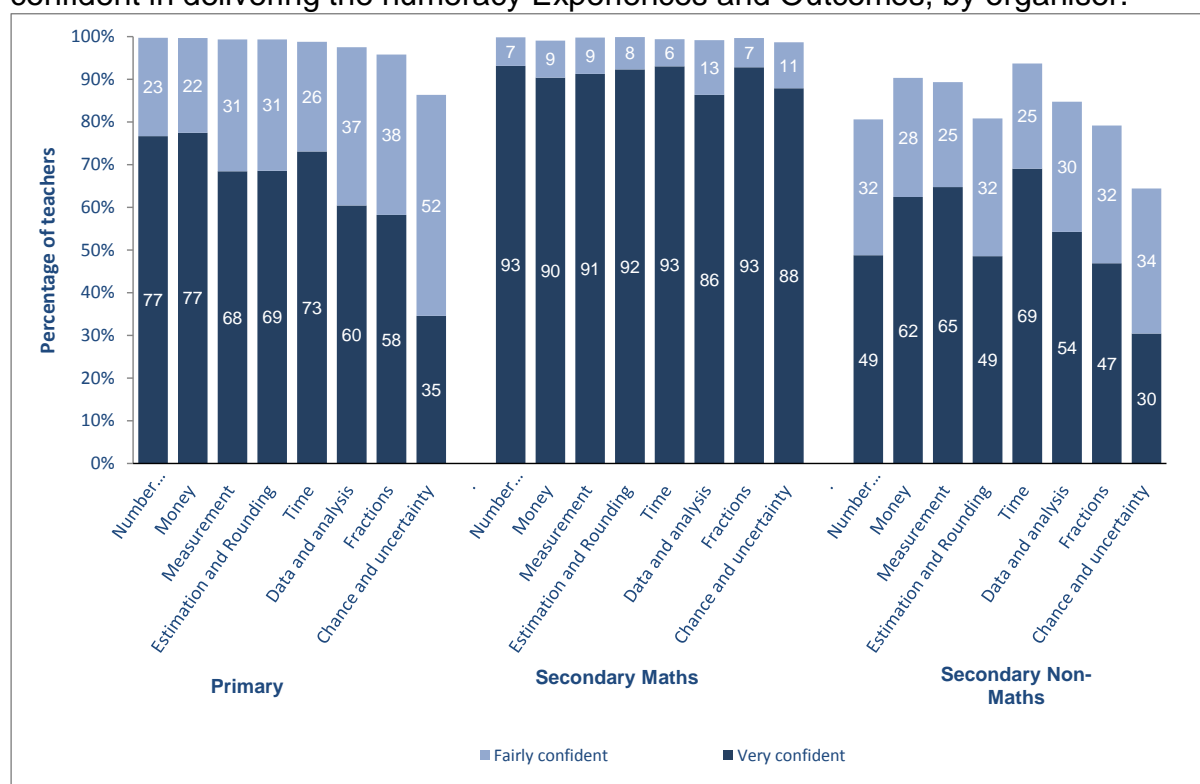
5.2 Teaching numeracy across the Curriculum

Chart 5.1 shows the percentage of teachers reporting they were very confident or fairly confident in delivering the numeracy Experiences and Outcomes. High proportions of primary school teachers and secondary maths teachers reported confidence, with over 95 per cent of teachers very or fairly confident in delivering the Experiences and Outcomes across all organisers in the numeracy curriculum. In relation to 'chance and uncertainty', the lowest proportion of teachers reported confidence in delivering this numeracy organiser in comparison to the others (86 per cent of primary teachers).

There were lower levels of teachers reporting confidence in delivering all organisers among secondary non-maths teachers, with the least confidence relating to teaching ideas of 'chance and uncertainty', where 64 per cent of teachers reported confidence. This was statistically significantly lower than the confidence reported in the other organisers by secondary non-maths teachers.

There was variation in confidence levels within the secondary non-maths teacher groups, as higher levels of ASN teachers reported confidence in delivering the Experiences and Outcomes across all numeracy organisers when compared to expressive arts and languages teachers. For example, all ASN teachers reported confidence in delivering the 'time' experiences and outcomes, compared to 90 per cent of expressive arts and languages teachers. Also, 81 per cent of ASN teachers reported confidence in delivering the 'chance and uncertainty' experiences and outcomes, compared to 49 per cent of expressive arts and languages teachers.

Chart 5.1: Percentage of teachers reporting they were very confident or fairly confident in delivering the numeracy Experiences and Outcomes, by organiser.



In 2013, statistically significantly higher levels of secondary maths and secondary non-maths teachers reported confidence in teaching all numeracy organisers compared to the 2011 survey. The only exception was ‘money’ in secondary maths teachers, where the difference was negligible.

For primary teachers, there were small but statistically significant increases in the levels of teachers reporting confidence in teaching ‘estimation and rounding’, ‘number and number processes’, ‘money’ and ‘data and analysis’ between 2011 and 2013.

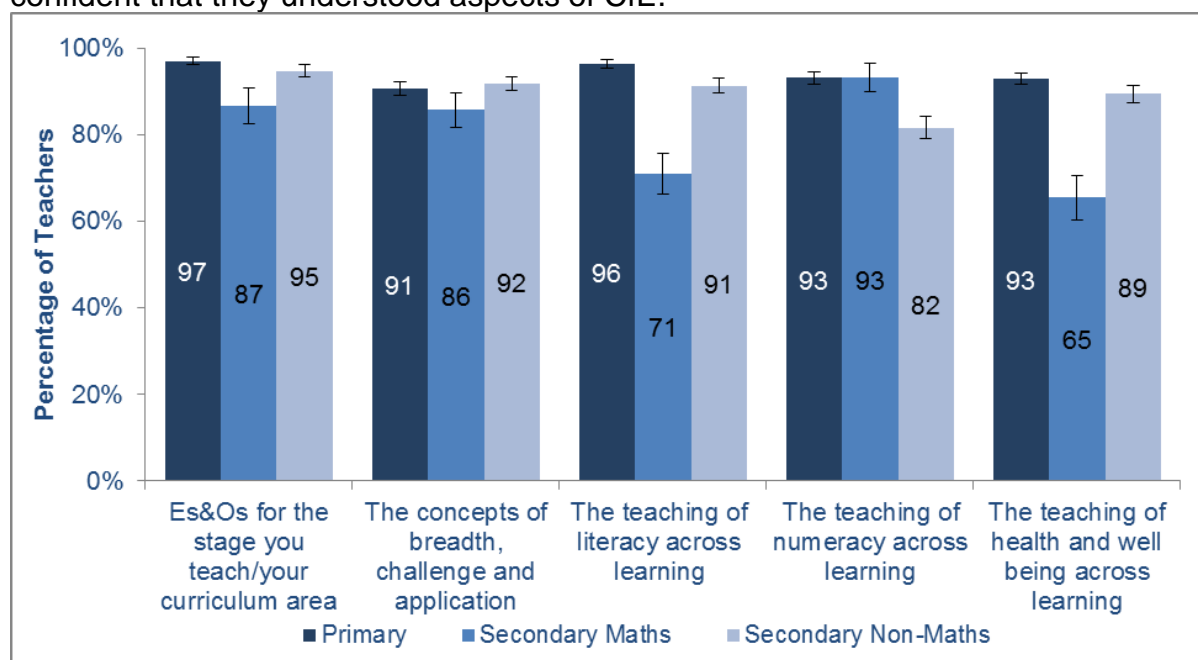
The rise in the proportion of secondary teachers reporting confidence in 2013 compared to 2011 may be the result of CfE being more embedded in secondary schools so teachers are more confident in teaching the concepts included in the Curriculum.

5.3 Aspects of Curriculum for Excellence

Teachers were asked about their levels of confidence with understanding various aspects of CfE, as shown in Chart 5.2. Between 87 and 97 per cent of teachers were either very confident or fairly confident that they understood the Experiences and Outcomes for their curriculum area.

Primary school and secondary maths teachers were more confident in their understanding of teaching numeracy across learning compared to secondary non-maths teachers, with 93 per cent being very confident or fairly confident about this aspect of CfE, compared to 82 per cent of secondary non-maths teachers. Lower levels of secondary maths teachers reported confidence about the aspects of literacy and health & wellbeing across learning (71 per cent and 65 per cent respectively).

Chart 5.2: Percentage of teachers reporting they were very confident or fairly confident that they understood aspects of CfE.



Statistically significantly higher levels of secondary maths and non-maths teachers reported confidence in their understanding of the majority of these aspects of CfE in 2013 compared to 2011. The only exception was secondary maths teachers where the change in their confidence in understanding the Experiences and Outcomes for their area was negligible, but remained high at around 87 per cent.

There was a small increase in the proportion of primary teachers who reported confidence in their understanding of the Experiences and Outcomes at 97 per cent in 2013 (very or fairly confident), compared to 95 per cent in 2011. The changes for all other aspects were negligible.

Teachers were also asked how confident they were that they could improve learning using these particular aspects of CfE. About 92 per cent of primary teachers and about 86 per cent of secondary teachers reported they were very confident or fairly confident that they can improve learning using the Experiences and Outcomes for the stage they teach.

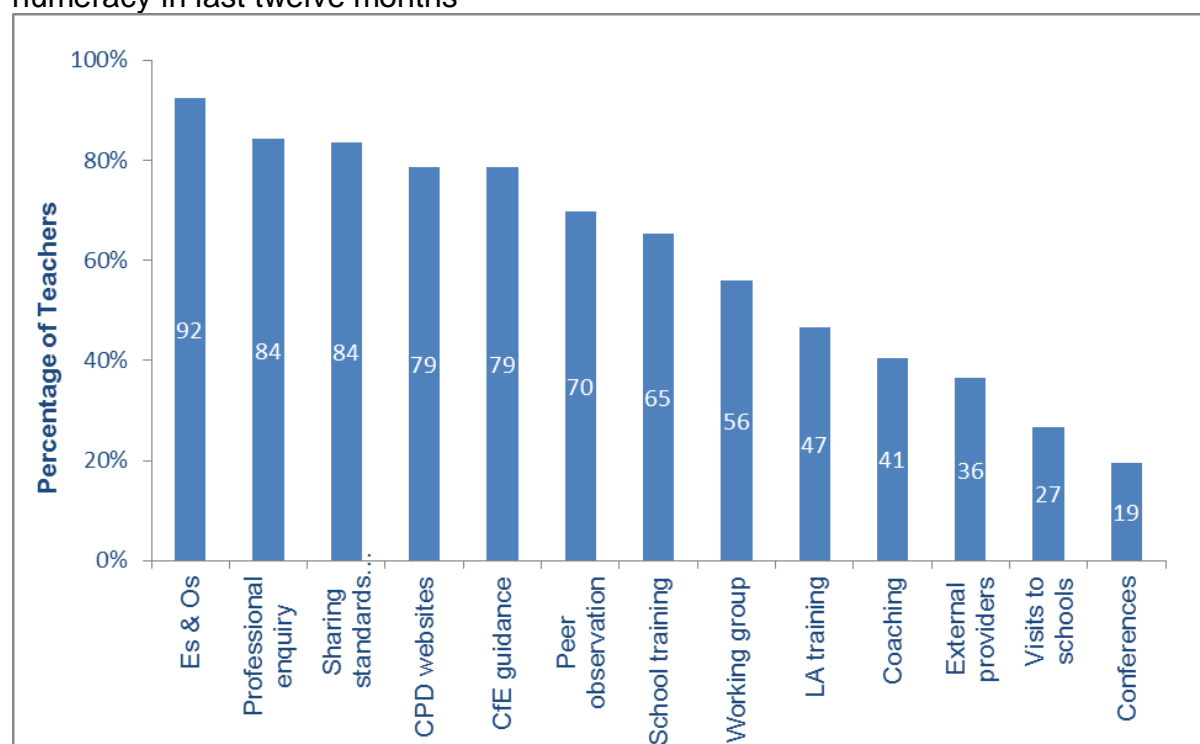
5.4 Professional Development

Teachers were asked how often they had taken part in various forms of continuing professional development (CPD) in the last twelve months and, if they had, how useful they had found it. The CPD related to numeracy Experiences and Outcomes only. This explains the reported lower participation rates for secondary non-maths teachers when compared to primary teachers and secondary maths teachers.

Amongst primary school teachers and secondary maths teachers the most frequently used forms of CPD were:

- reading and discussing the numeracy Experiences and Outcomes (Es & Os) with colleagues (92 per cent of primary teachers and 96 per cent of secondary maths teacher had taken part in this CPD activity)
- sharing standards and moderation (84 per cent and 90 per cent had taken part respectively)
- professional enquiry through reading/personal study (84 per cent and 89 per cent had taken part respectively)

Chart 5.3: Percentage of primary school teachers participating in CPD activity in numeracy in last twelve months



See data tables for full descriptions and for responses for secondary school teachers.

The CPD activity with the highest rating for level of impact was reading and discussing the numeracy Experiences and Outcomes with colleagues with 71 per cent of primary teachers and 61 per cent of secondary maths teachers who had taken part rating the impact of the activity as high or very high. Other activities rated as having a high or very high impact were 'sharing standards and moderation' and 'membership of working groups at school, local or national level'.

Chapter 6: Background notes

6.1 Sampling frame

The sampling frame for the pupil sample is all P4, P7 and S2 pupils attending all mainstream schools in Scotland that have agreed to participate in the SSLN. Gaelic medium and independent schools are included in the SSLN, however special schools are not.

The sampling frame for the teacher questionnaire is all Primary 4, Primary 7 and secondary teachers in all participating schools.

6.2 Sample design

The pupil sample design is a two stage stratified random sample, i.e. pupils are selected at random within schools and by gender. The sample consists of two P4 and two P7 pupils from every participating primary school and up to twelve S2 pupils from every participating secondary school. This produces a target sample size of around 4,000 pupils per stage. Pupil results are weighted to account for different school sizes, the small number of non-participating schools and gender and deprivation differences between the sample and the population.

The teacher questionnaire is allocated to all P4 teachers at half of participating primary schools and all P7 teachers at the remaining half of participating primary schools. Within secondary schools, the teacher questionnaire is allocated to ten teachers covering an equal distribution of four broad curriculum areas and maths. This produces a total target sample size of around 5,500 teachers. Teacher results are weighted to account for non-response and differences in school size.

6.3 Response rate

The response rate at school level was 96 per cent in publicly funded schools and 23 per cent of schools in the independent sector.

6.4 Interpretation of SSLN results

As in all sample surveys, as the SSLN is based on a sample of pupils rather than on the whole population, the results shown are estimates. Therefore there is an element of uncertainty within the results because the pupils sampled may not reflect the population exactly.

Uncertainty around the results is estimated using standard errors. Standard errors are a measure of the variation in the data i.e. how each observation differs from the mean. As the SSLN sample design is not a simple random sample - in the SSLN pupils at small schools have a higher probability of being selected than pupils at large schools - this means that standard formulae used to calculate the standard error from a simple random sample would not be appropriate. Standard errors are therefore calculated empirically using the jackknife procedure.

Standard errors are in turn used to produce confidence intervals around the estimates. Confidence intervals show the range of values within which one can be reasonably confident that the actual value would lie if all pupils were assessed.

Ninety-five per cent confidence intervals for the main national estimates were calculated and were around \pm two percentage points. This means that the true value of each estimate is likely to lie within two percentage points either side of the given estimate.

Where appropriate, confidence intervals are represented on charts by error bars to help demonstrate this level of uncertainty. Where the estimates are different but the error bars overlap we cannot be sure that the true values of each estimate are statistically significantly different from each other. Significance tests (t-tests) are used to assess the statistical significance of comparisons made.

Standard error data for the results, used to calculate these confidence intervals, are provided in the supplementary tables available at www.scotland.gov.uk/ssltn.

6.5 Sources

Attainment data are derived from the results of assessments completed by participating pupils. For the numeracy survey the assessment consists of two written assessment booklets and one practical assessment. Written booklets consist of short answer (atomistic) tasks and multi-item (extended) tasks, which was based on a source datasheet with multiple associated questions. The practical assessment consists of a one-to-one verbal assessment between the pupil and the classroom teacher or another member of teaching staff.

All participating pupils complete an online questionnaire on factors that are likely to affect learning and attainment, such as pupil attitudes and experiences in class.

Sampled teachers are asked to complete an online questionnaire on their experiences and views on teaching numeracy.

All SSLN data was collected during the fieldwork period of 6th May – 7th June 2013.

6.6 Use made of SSLN data

The results of the 2013 SSLN will be used in line with the survey's three main objectives. These are:

- to monitor and report nationally on achievement in numeracy at the P4, P7 and S2 stages in 2013 and over time
- to identify areas of numeracy strengths and weaknesses among pupils in Scotland to help inform policy initiatives and learning and teaching practices
- to gather information and report nationally on pupils' and teachers' experience of learning and teaching numeracy, along with their views about this experience.

In line with the aim to improve learning and teaching practice, Education Scotland has developed PLRs based on an in-depth analysis of the SSLN data. These resources are used by teachers, schools and authorities to support and inform learning and teaching practice in the classroom. These resources are available on the [Education Scotland website](#).

The ways in which these materials can be used are set out below.

In the classroom, as a practitioner:

- as a resource for Career Long Professional Learning (CLPL) through use of the reflective questions provided for self-evaluation
- to focus lesson planning linking to known areas for improvement
- as a resource with links to further reading to help develop new concepts and ideas in teaching numeracy
- to enhance children and young people's numeracy skills, through use of the example questions and links to additional support materials
- to share views on numeracy across learning through use of the activities for teachers to stimulate dialogue and debate on teaching practice
- to support children and young people's numeracy learning across the Curriculum.

In school, as a leader or manager:

- "to inform development plans to improve standards in numeracy" as per the CfE Implementation Plan
- to inform school improvement plans - the resource includes high level findings with reflective questions for whole school self-evaluation to focus discussions around school improvement planning in relation to numeracy
- to lead CLPL sessions – the resources include a range of materials which can be used to lead specific sessions focussing on particular areas of numeracy e.g. pedagogy across the school, development of numeracy skills and strategies for learning and teaching to support these skills
- to provide a focus for classroom observation – learning communities in schools can use the resources to identify areas for improvement in their own context. The appendices contain exemplar sheets for focused observation at school level.

At local authority level, as a development officer or Quality Improvement Officer:

- to provide a focus when supporting individual schools or clusters, to identify clear targets for improvement
- to inform and expand the range of professional development opportunities available for teachers
- to clarify the aspirations contained in the numeracy Experiences and Outcomes
- to identify clear targets for improvement
- to inform transition projects by promoting collegiality with staff from primary and secondary schools.

6.7 Supplementary tables

The survey contains a huge amount of data which cannot be summarised in this publication. This report seeks to highlight the key messages and give a flavour of the range of analysis possible. Detailed tables of the performance data and pupil and teacher questionnaire results are published as supporting tables alongside this publication, and provide a fuller picture of the findings.

The following list of tables will be available at www.scotland.gov.uk/ssl/n

Table
Attainment
1.1 Distribution of scores by stage
1.2 Proportion of pupils in each reporting category by stage
1.3 Proportion of pupils in each reporting category by gender and stage
1.4 Distribution of scores by deprivation category and stage
1.5 Proportion of pupils in each reporting category by deprivation category and stage
1.6 Percentage of tasks answered correctly, by organiser and stage
1.7 Percentage of tasks answered correctly, by type of question and stage
1.8 Percentage of mental maths tasks answered correctly, by operator and stage
Assessment Over Time
2.1 Proportion of pupils in each reporting category by stage for 2011 and 2013
2.2 Proportion of pupils in each reporting category by gender and stage for 2011 and 2013
2.3 Proportion of pupils in each reporting category by deprivation category and stage for 2011 and 2013
2.4 Percentage of tasks answered correctly, by organiser and stage for 2011 and 2013
Pupil Questionnaire
3.1 In your classes, how often do you . . .
3.2 In your classes, how often do your teachers . . .
3.3 How often does someone in school (e.g. class teacher / head teacher) talk with you about . . .
3.4 What pupils think about their learning - engagement
3.5 What pupils think about their learning - usefulness
3.6 How confident pupils feel about learning
3.7 What pupils think about working with numbers - general
3.8 What pupils think about working with numbers - organisers
3.9 How often does someone at home do the following?
3.10 How often do you do these things outside of school?
Teacher Questionnaire
4.1 On average during lessons, how often do pupils spend time doing the following?
4.2 When focusing on numeracy, how often do you make use of the following?
4.3 How often do you find opportunities to reinforce pupils' numeracy skills?
4.4 How well can the following numeracy skills be integrated into teaching the various curriculum areas?
4.5 In S2, how well can the following numeracy skills be integrated into your curriculum area?
4.6 How confident are you in delivering the numeracy experiences and outcomes?
4.7 How confident are you that you understand the following aspects of Curriculum for Excellence?
4.8 How confident are you that you can improve learning using . . .
4.9 Gathering evidence of pupils' achievement in numeracy
4.10 In evaluating pupils' achievements in numeracy and recording the evidence, how often do you . . .
4.11 Continuing Professional Development (CPD) in Numeracy
Survey Data
5.1 Sample sizes for each element of the survey

6.8 Cost of compliance

One of the recommendations resulting from the UKSA assessment of the SSLN was to publish an estimate of the cost to data suppliers for participation. The Government Statistical Service has devised a method for estimating the cost that avoids imposing an extra burden on data providers. The method for calculating cost to organisations, including schools, is:

Cost = (number of responses x median time taken to respond in hours x hourly rate of typical respondent) + any additional costs experienced by data providers.

This methodology has been applied to the SSLN administration model and the estimated cost of compliance for the SSLN 2013 (numeracy) survey was £455,000.

6.9 Further information

Further information on the SSLN, including the supplementary tables and Survey Design Document, is available from www.scotland.gov.uk/ssltn.

There is a range of other reliable information on the performance of Scotland's school pupils.

Scotland participates in the OECD's triennial Programme for International Student Assessment (PISA) survey. This assessment is carried out by 15 year-olds in over sixty countries, including all OECD countries, and as such is a key international benchmark of performance. The results of previous PISA surveys are available at www.scotland.gov.uk/pisa

The Scottish Government also publishes analysis of SQA exam results and leaver destinations. The latest post-appeal data are available at <http://www.scotland.gov.uk/Publications/2013/06/7503/0>

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The data collected for this statistical bulletin:

- ☐ are available at: www.scotland.gov.uk/ssln
- ☐ may be made available on request, subject to consideration of legal and ethical factors. Please contact ssln@scotland.gsi.gov.uk for further information.

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